Balazs, G. 1995. Growth rates of immature green turtles in the Hawaiian Archipelago, p.117-125. In: K. A. Bjorndal (Editor), Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington D.C.

Boulon, R. H., Jr. and N. B. Frazer. 1990. Growth of wild juvenile Caribbean green turtles, Chelonia mydas. J. Herpetol. 24:441-445.

Carr, A. 1983. Chelonia mydas, p.390-392. In: D. Janzen (Editor), Natural History of Costa Rica. University of Chicago Press, Chicago.

Carr, A., M. H. Carr and A. B. Meylan. 1978. The Ecology and Migrations of Sea Turtles, 7. The West Caribbean Green Turtle Colony. Bull. Amer. Mus. Natur. Hist. 162(2):1-46.

Defensoria de Los Habitantes. 1997. Expediente No. IO 1575-23-96: Informe Final con Recomendaciones.

Groombridge, B. (Editor). 1993. 1994 IUCN Red List of Threatened Animals. World Conservation Union (IUCN), Cambridge. 286 pp.

PATRICIO OPAY, Estación Biológica Caño Palma, Tortuguero, COSTA RICA. Correspondence address: SJO 1882, Box 025216, Miami, Florida 33102-5216 USA; e-mail: gsaenz@sol.racsa.co.cr

TESTING HYPOTHESES OF THE KEMP'S RIDLEY HEAD-START EXPERIMENT

In 1976, the U. S. National Park Service (NPS) proposed discussions with the U. S. Fish and Wildlife Service (FWS) concerning a project whose goal was the establishment of a nesting population of Kemp's ridley sea turtles (Lepidochelys kempii) at Padre Island National Seashore (PINS) near Corpus Christi, Texas (Woody, 1989). Under contract with FWS, NPS evaluated the suitability of PINS as a sea turtle nesting beach. By January 1977, NPS and FWS had convinced Mexico's Departamento de Pesca, Texas Parks and Wildlife Department, and the U. S. National Marine Fisheries Service to join them in a Kemp's Ridley Recovery Program, part of which was the feasibility study called "head-start" (see reviews by Donnelly, 1994 and Eckert et al., 1994). Florida Audubon Society and the Gladys Porter Zoo (Brownsville, Texas) also participated.

Now that two nestings by head-started Kemp's ridleys have been documented at PINS (Shaver, 1996a,b), it seems an appropriate time to place these nestings in the context of the experiment's working hypotheses. In their peer review conducted in 1992, Eckert et al. (1994) stated the hypotheses as follows: (1) Head-starting can produce Kemp's ridley juveniles which are able to join the natural, wild populations, find their way to nesting beaches, procreate and hatch viable offspring of their own; and (2) head-started turtles demonstrate equivalent or superior biological fitness, defined as equal or better survival rates from egg to reproductive adult, and equivalent or better fecundity when compared to wild Kemp's ridleys. The two nestings (Shaver 1996a,b) and the accumulated mark-recapture evidence of the distribution of head-started turtles throughout the geographic range and typical habitats of the species (see Caillouet et al., 1995 for references) essentially prove the first hypothesis. We expect further support for this hypothesis to emerge as more attention is focused on examination of Kemp's ridleys for head-start tags (Byles, 1993; Fontaine et al., 1993; Williams, 1993; Caillouet et al., 1997).

The second hypothesis concerning biological fitness is yet to be tested. It will be more difficult to test than the first hypothesis due to sample size differences (head-started vs. wild) and confounding effects. Eckert et al. (1994) recommended a wild hatchling tagging program to provide a control for comparison with head-started turtles. In response, 3,336 hatchlings were tagged with non-magnetized wire tags at Rancho Nuevo, Tamaulipas, Mexico in 1996. An additional 10,002 hatchlings were similarly tagged in 1997, and current plans call for tagging up to 10,000 more in 1998 (Caillouet et al., 1997). Sample sizes of captive-reared Kemp's ridleys released from year-class 1996 (174 turtles) and of those to be released from the 1997 year-class (currently rearing 179 turtles) will not be comparable to sample sizes of the same cohorts of tagged wild turtles (Caillouet et al., 1997), unless the wild cohorts experience first-year mortality rates of 90% or more. Such high mortality rates in pelagic immatures are not expected (Byles et al., 1996; Heppell and Crowder, 1996).

Eckert et al. (1994) emphasized that head-started turtles represent only a small proportion of the total population, virtually guaranteeing they will not be detected at current levels of nesting beach coverage, despite bearing one or more tags. Turtles bearing external tags are more likely to be reported than those without such tags (Eckert et al., 1994), so reporting of head-started turtles may still be biased upward as compared to wild ones bearing only internal wire tags. Another confounding factor is that most head-started turtles were released during years in which turtle excluder devices (TEDs) were not required in shrimp trawls (Eckert et al., 1994), whereas the wild turtles tagged as hatchlings will only have been exposed to shrimping with TEDs. One would expect survival rates of head-started turtles to be lower for that reason alone.

Examination of Kemp's ridleys for tags, especially those applied to captive-reared turtles (Byles, 1993; Fontaine et al., 1993; Williams, 1993; Caillouet et al., 1997), will likely provide more support for hypothesis 1. Fecundity has been determined on only two head-started Kemp's ridleys released into the wild (Shaver 1996a,b). A comparison of survival rates of head-started (Caillouet et al., 1995) and wild Kemp's ridleys will require maturation and nesting of wild wire-tagged turtles, but this comparison will be confounded with TED effects.

Byles, R. 1993. Head-start experiment no longer rearing Kemp's ridleys. Marine Turtle Newsletter 63:1-2.

Byles, R., C. Caillouet, D. Crouse, L. Crowder, S. Epperly, W. Gabriel, B. Gallaway, M. Harris, T. Henwood, S. Heppell, R. Marquez-M., S. Murphy, W. Teas, N. Thompson and B. Witherington. 1996. A report of the Turtle Expert Working Group: Results of a Series of Deliberations Held in Miami, Florida, June 1995-June 1996. National Marine Fisheries Service, Southeast Fisheries Science Center, Miami.

Caillouet, C. W., Jr., C. T. Fontaine, S. A. Manzella-Tirpak and D. J. Shaver. 1995. Survival of head-started Kemp's ridley sea turtles (Lepidochelys kempii) released into the Gulf of Mexico or adjacent bays. Chelonian Conservation and Biology 1:285-292.

Caillouet, C. W., Jr., B. A. Robertson, C. T. Fontaine, T. D. Williams, B. M. Higgins and D. B. Revera. 1997. Distinguishing captive-reared from wild Kemp's ridleys. Marine Turtle Newsletter 77:1-6.

Donnelly, M. 1994. Sea turtle mariculture: a review of relevant information for conservation and commerce. The Center for Marine Conservation, Washington, D.C. 113 p.

Eckert, S. A., D. Crouse, L. B. Crowder, M. Maceina and A. Shah. 1994. Review of the Kemp's ridley sea turtle headstart program. NOAA Tech. Memo. NMFS-OPR-3. U. S. Dept. Commerce. 10 pp.

Fontaine, C. T., D. B. Revera, T. D. Williams and C. W. Caillouet, Jr. 1993. Detection, verification and decoding of tags and marks in head started Kemp's ridley sea turtles, Lepidochelys kempii. NOAA Tech. Memo. NMFS-SEFC-334. U. S. Dept. Commerce. iii plus 40 pp.

Heppell, S. S. and L. B. Crowder. 1996. Models to evaluate headstarting as a management tool for long-lived turtles. Ecological Applications 6:556-565.

Shaver, D. J. 1996a. A note about Kemp's ridleys nesting in Texas. Marine Turtle Newsletter 75:25-26.

Shaver, D. J. 1996b. Head-started Kemp's ridley turtles nest in Texas. Marine Turtle Newsletter 74:5-7.

Williams, P. 1993. NMFS to concentrate on measuring survivorship, fecundity of head-started Kemp's ridleys in the wild. Marine Turtle Newsletter 63:3-4.

Woody, J. B. 1989. International efforts in the conservation and management of Kemp's ridley sea turtles (Lepidochelys kempi), p. 1-6. In: Caillouet, C. W., Jr. and A. M. Landry, Jr. (Editors), Proceedings of the First International Symposium on Kemp's Ridley Sea Turtle Biology, Conservation and Management, Texas A&M University, Sea Grant College Program. TAMU-SG-89-105. 260 pp.

CHARLES W. CAILLOUET, JR., NOAA National Marine Fisheries Service, Southeast Fisheries Science Center, Galveston Laboratory, 4700 Avenue U, Galveston, Texas 77551 USA.

HAWKSBILL TAGGED IN THE BAHAMAS RECAPTURED IN CUBA

In recent years, there has been increased interest in the degree to which hawksbill turtles (Eretmochelys imbricata) in Cuban waters are isolated from other populations in the Greater Caribbean and the extent to which hawksbills move into and out of Cuban waters (Moncada Gavilan, 1994; Bowen et al., 1996; Heppell and Crowder, 1996). We have just received a tag return from Cuba for a hawksbill that we tagged at Union Creek, Great Inagua, Bahamas (21°07'N, 73°34'W). The hawksbill, which had a straight carapace length (SCL, from nuchal notch to tip of posterior marginal) of 51.6 cm, was tagged on 1 October 1992 with four plastic tags (Dalton Jumbo-Roto). We did not see it again after release. In August 1997, Luis Alfredo Diaz Alavarez, a Cuban fisherman from Banes, Cuba, captured the turtle over a reef about 1 km offshore from Puerto Rico Beach, Banes, Holguín, Cuba. He reported that all tags were still attached to the turtle. This recapture represents a minimum distance of approximately 200 km over water depths of more than 3000 m.

Although our long-term studies at Great Inagua focus on immature green turtles, we also tag hawksbills whenever they are encountered. Since 1975, we have tagged 46 hawksbills with a range of SCL from 24.3 to 71.3 cm. The recapture of only one other hawksbill tagged at Inagua has been reported to us. In September 1983, an immature hawksbill (46.9 cm SCL) tagged at Inagua on 10 September 1982 was recaptured on Providenciales, Turks and Caicos